SMART (SMART MATHEMATIC WITH AUGMENTED REALITY TECHNOLOGY) FOR PRESCHOOL

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Fokus utama projek ini adalah mengenai Augmented Reality. Projek yang dibangunkan adalah sebuah aplikasi pendidikan matematik awal bagi kanak-kanak prasekolah dengan menggunakan pendekatan teknologi Augmented Reality. Buku bergambar 2D yang digunakan oleh guru di dalam kelas atau ibu bapa di rumah sebagai medium pembelajaran matematik awal bagi kanak-kanak prasekolah semakin membosankan dan tidak mengikuti perkembangan teknologi terkini. Kewujudan teknologi Augmented Reality yang membolehkan objek 3D timbul pada imej 2D mampu menarik minat kanak-kanak dengan lebih mendalam. Di samping itu, penyampaian kandungan pembelajaran juga dapat di sampaikan dengan lebih mudah tanpa memerlukan bimbingan orang dewasa sepenuhnya. Selari dengan fenomena masa kini iaitu kanak-kanak lebih gemar menggunakan gajet berbanding buku, aplikasi ini telah menggabungkan kedua-dua elemen tersebut iaitu buku dan gajet bagi meningkatkan lagi tahap interaktif dan keseronokan kanak-kanak prasekolah untuk menerokai isi pembelajaran matematik awal prasekolah. Pembangunan aplikasi SMART (Matematik Awal Prasekolah) ini adalah berdasarkan Kurikulum Standard Prasekolah (KSPK) dan telah dibangunkan menggunakan kaedah model ADDIE. Menerusi pembangunan aplikasi ini, pembelajaran matematik awal sama ada di prasekolah atau rumah pasti lebih menyeronokkan. Matlamat utama pembangunan aplikasi ini adalah supaya dapat membantu meningkatkan penguasaan konsep nombor dan kemahiran matematik dalam kalangan kanak-kanak prasekolah.

ABSTRACT

The focus of this project is on Augmented Reality. This study is about the development of early mathematics education applications for preschool children by using the Augmented Reality technology approach. 2D illustrated books used by teachers in the classroom or parents at home as a medium of early mathematic learning for preschoolers are getting boring and not following the latest technology developments. The traditional 2D picture book is now more attractive with the existence of augmented reality technology which is capable to bring 3D objects on the 2D image. In addition, the delivery of learning content can also be delivered more easily without the adult full guidance. In line with current phenomenon where children prefer to use gadgets instead of books, this application combines both elements which is book and gadget to enhance the interactive and fun levels among preschoolers to explore the contents of pre-school math learning. The development of SMART (Preschool Early Mathematic) is based on the Preschool Standard Curriculum (KSPK) and has been developed using the ADDIE model method. Through this application, early math learning whether at preschool or home is certainly more fun. With the existence of this application, it is hoped that it can help to increase the mastery of numerical concepts and math skills among preschoolers.

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LIST OF ABBREVIATIONS

2D	2 Dimension
3D	3 Dimension
AR	Augmented Reality
BBM	*Bahan Bantu Mengajar*
KPM	*Kementerian Pendidikan Malaysia*
KSPK	*Kurikulum Standard Prasekolah Kebangsaan*
P & P	*Pengajaran dan Pembelajaran*
PPM	*Pembantu Pengurusan Murid*
PPPM	*Pelan Pembangunan Pendidikan Malaysia*
SMART	Smart Mathematic with Augmented Reality Technology
TMK	*Telekomunikasi Maklumat dan Komunikasi*

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The Education Act (1996) that already approved make a significant change in preschool education, which is preschool education policy has been implement into the National Education System. The change of this policy are clearly shows that the Ministry of Education (*Kementerian Pendidikan Malaysia* (KPM)) is constantly working to maintain and improve the quality of preschool education. Even so, preschool teachers need to have extensive knowledge of preschool education which includes some main aspects such as the development of kid's cognition and teaching and learning process (*Pengajaran dan Pembelajaran* (P&P)) strategies (*Pendidikan Dan Pembangunan Manusia,* 2016).

Starting in 2002, all the children's learning centres are managed by the Ministry of Education or organized by the private sector must follow the prescribed syllabus provided by KPM. Therefore, the implemented Preschool Education Program can be said able to provide knowledge exposure, basic skills and values to kids. All these aspects are applied practically and informally as well as in a fun atmosphere through a learning while playing approach.

Due to the rapid development of technology, preschool teachers should introduce more sophisticated learning methods in line with latest technological developments. In this way, cognitive development and technology knowledge in every pre-schooler can be improved. Kids need to have early exposure on technology usage so that they can use the internet application towards a positive and help them in the learning process.

Attractive activities are able to provide a more effective understanding of Math to normal kids. For example, number-related learning usually occurs through experience, social interaction, time, language and understanding. In preschool education, teachers play an important role in planning attractive and meaningful activities for preschoolers. The Use of Teaching Materials (*Bahan Bantu Mengajar* (BBM)) in the teaching and learning processes is very important for teachers to ensure the information is delivered clearly to their students.

However, it seems the traditional teaching materials that been used by the teachers in Malaysia such as books and flashcard is less interesting and not enough to attract the preschoolers to give their attention during the learning session. This can cause children failed to have a solid mathematical development experience. Children should be given a good pre-numerical basis and experience as a solid preparation for Mathematics learning at a higher level. Additionally, in this present technology, these materials seem like has been far outdated.

Augmented Reality is one of the emerging technologies that can be integrated in teaching and learning. The use of Augmented Reality can make learning process to be more fun, through which preschoolers interest towards learning can be boosted. In other countries, Augmented reality technology is now often used in learning process at this 21st century. However, in Malaysia this technology has not yet been widely applied in schools. This project is aimed to upgrading the 2D teaching materials (BBM) of Counting numbers in Concept Number syllabus. To increase attention from preschoolers during the learning session, Augmented Reality technology are proposed to be integrated into teaching materials such as flashcards and books that used by the teachers in the preschool.

1.2 PROBLEM STATEMENT

Current learning method at preschool are fully guided by teacher. While at home, they need to be guided by their parents to complete ununderstood homework. Indirectly, this current method becomes not attractive, interactive and sometimes not effective. There are many countries that already introduced self-learning by using latest technology to preschool kids. Now it's time for our country to introduce self-learning to preschoolers by using more sophisticated technology such as self-learning application using augmented reality.

Kids are more attracted to gadget. The power of gadget over the kids which hit at this moment is not only a phenomenon in Malaysia, but also kids around the world when most of parents express their anxiety for the same issue. However, the existence of gadgets should not be blamed because gadgets also have their own benefits. Studies that conducted by independent researchers found that the use of technology was able to support the tendency of children to learn (Prof Dr M. Swamenathan, 2014). Hence, the gadgets given to kids can be filled with more beneficial applications such as edutainment games for early math.

There is no existing application that follow the exact National Preschool Standard Curriculum of early math by Kementerian Pendidikan Malaysia in market. Although there are many flashcards and books with augmented reality (AR) technology in the market, most of them are about learning ABC than numbers. In fact, there is still no early math augmented reality (AR) book for preschoolers that comes with Malay language. This shows that our preschools educational levels are not competitive and not following the current technologies.

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